Root Submergence Technique in Mandibular Anterior Esthetic Zone for Pontic Site Development for Future Fixed Dental Prosthesis: A Case Report

Shriya Gupta*, Sandeep Tandon, Ambika Singh Rathore, Meenakshi Sharma, Mayur Mhole, Kaluram Kumawat
Department of Pedodontics and Preventive Dentistry, RUHS College of Dental Sciences, Jaipur, Rajasthan, India.

Abstract

Background: This case report discusses the effect of a root submergence technique (RST) for preserving the bone along with the periodontal tissue at the pontic site for future fixed dental prostheses in the mandibular anterior aesthetic zone. **Materials and Methods:** Teeth with complicated crown root fracture in esthetic zone with subgingival fracture line at crestal bone level were preserved following RCT treatment. After soft-tissue closure, the interim prosthesis was given in the submerged root area. Radiographic and clinical observations at the pontic sites were documented. **Results:** The submerged roots at the pontic sites preserved the surrounding periodontium without any periapical pathology. The gingival contour at the pontic site was maintained in harmony with those of the adjacent teeth, as well as the overall form of the arch. **Conclusion:** The results of this clinical report indicate that a RST can be successfully applied in pontic site, especially in esthetic zone.

Keywords: Root submergence, Fixed dental prostheses, Pontic.

Introduction

Management of complex tooth/complicated crown root fracture in esthetic zone in growing children is a challenging task for a pediatric dentist.[1] The goal of treatment should include the preservation of alveolar bone, to maintain normal growth and development of maxillofacial region, to maintain space for future pontic or implant, and to prevent development of abnormal habits.[2-5] This study reports a case of management of complex crown root fracture with root submergence technique (RST).[6] This technique helps to maintain the natural periodontium of tooth which, in turn, allows to prevent the resorption of alveolar bone and helps to maintain the space for future pontic and implant site.[7-9]

Case Report

A 9-year-old male patient reported to the department of pediatric and preventive dentistry with chief complaint of missing lower anterior teeth. The patient had history of trauma 15 days back while cycling. On intraoral examination, there were missing permanent mandibular right and left central incisors with no any other clinical finding of surrounding hard and soft tissue (Figure 1). The radiographic examination revealed complicated crown root fracture with horizontal fracture line below the alveolar ridge margin. A radiographic examination confirmed the diagnosis with Ellis class VIII # with pulp exposure and complete root development of tooth in relation with 31 and 41 (Figure 2). After a holistic assessment of clinical and radiographic findings, the decision was made to perform *in situ* submergence of the non-vital root fragment. RST was planned and explained to the parents of the patient.

Clinical Procedure

After obtaining consent from patient, the treatment was started. The patient preparation was done with proper extraoral asepsis with 2% povidone-iodine followed by intraoral pre-procedural 0.2% chlorhexidine rinses. The procedure was performed under local anesthesia (2% lignocaine with adrenaline 1:80000), after achieving anesthesia using inferior alveolar nerve block

Address for correspondence: Shriya Gupta, Department of Pedodontics and Preventive Dentistry, RUHS College of Dental Sciences, Jaipur, Rajasthan, India.
Email: dr.mesharma@gmail.com

Received: Jan. 3, 2022; **Accepted:** Mar. 17, 2022; **Published:** Apr 24, 2022

How to cite this article: Gupta S, Tandon S, Rathore AS, Sharma M, Mhole M, Kumawat K. Root Submergence Technique in Mandibular Anterior Esthetic Zone for Pontic Site Development for Future Fixed Dental Prosthesis: A Case Report. J Res Adv Dent 2022;13(4):161-164.

Access this article online

Website: www.jrad.co.in

DOI: https://doi.org/10.53064/jrad.2022.13.4.223

crevicular incision was given with blade number 15 and labial and lingual mucoperiosteal flaps were raised and single sitting endodontic treatment was performed followed by obturation with gutta-percha points over which RMGIC was places. After achieving hemostasis, the flaps were approximated and sutures were given with black silk non-dissolvable suture material. The patient was prescribed analgesic and antibiotic for 5 days and instructed to rinse with 0.2% chlorhexidine every 12 h for 14 days. Post-operative written instructions were given and the patient recalled after 7 days (Figures 3-5). The sutures removal was done after a week followed by irrigation with povidone-iodine solution (Figure 6).

After 1 month of complete healing, alginate impression was made for the space maintainer, as the patient was in growing age that a modified groper appliance was fabricated and delivered. Follow-up of every 3 months was advised. First, follow has been done and no abnormal finding was observed and the patient is still under observation (Figures 7 and 8).

Discussion

The alveolar bone resorption following a tooth extraction is an inevitable and continuous phenomenon throughout the patient lifetime. The rate of resorption is 0.5 mm/year for maxilla and 4 times greater in mandible.[1,2] The resorption of the alveolar ridge directly related to outcome of final prosthesis.[3] The RST preserves the periodontium of surrounding root as a result the technique maintain the dimension of the alveolar ridge and surrounding tissue.[4] Orthodontic extrusion and crown lengthening were not planned due to insufficient root length. RST was first developed to preserve the periodontal attachment apparatus to increase the retention and stability of prosthesis.[5]

Figure 1: Pre-operative clinical view

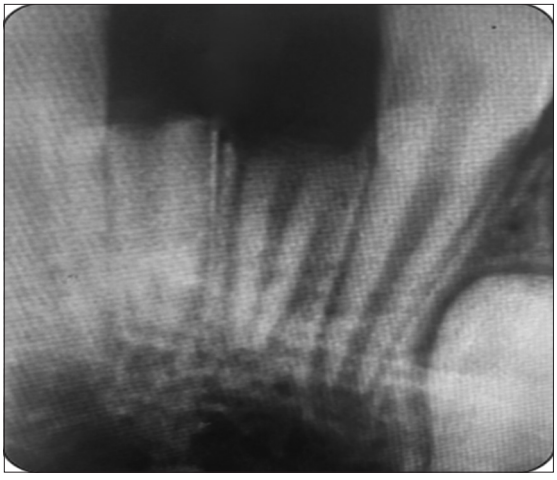

Figure 2: Pre-operative radiographic view

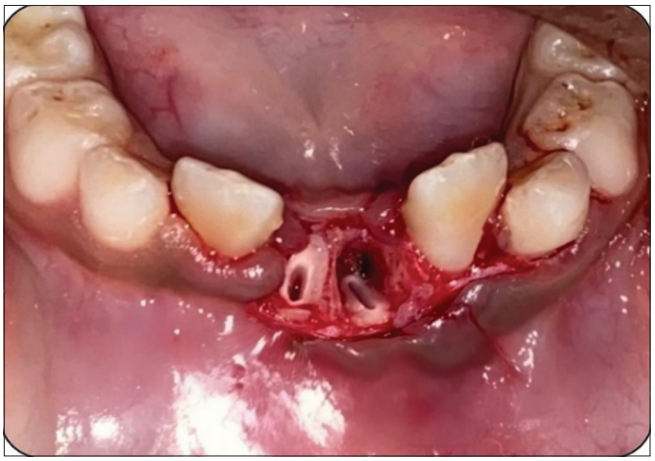

Figure 3: Intraoperative view

Figure 4: Flap approximation and suturing after root submergence

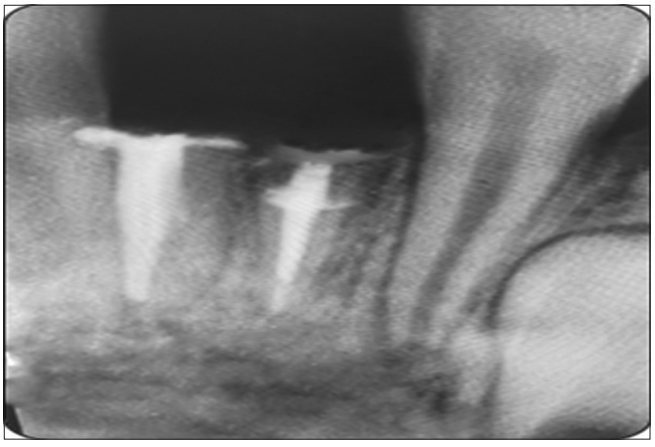

Figure 5: Post-operative radiographic view

Figure 6: One week follow-up

Figure 7: Post-operative clinical view with modified groper appliance

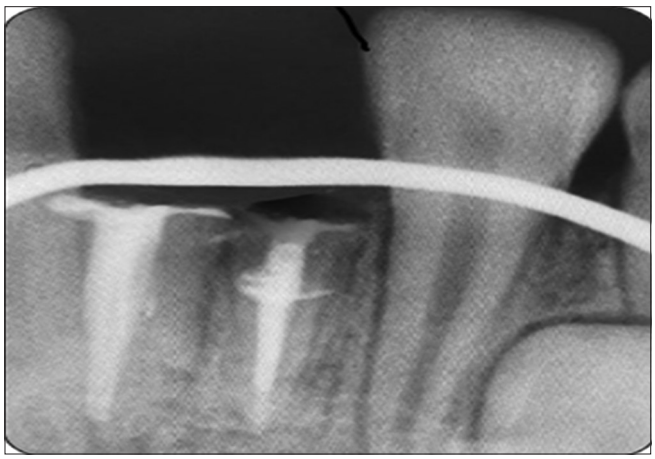

Figure 8: Three months follow-up

The buccal plate of maxillary anterior teeth is most often very thin results in significant dimensional changes during the immediate post-extraction period. Thus, reduced vertical ridge dimension and interdental bone lead to interdental papillary loss, and creation of black triangles results in unesthetic smile.[6,7]

The RST was introduced for the preservation of the alveolar ridge. It prevents the down growth of epithelium during the periodontal regeneration.[8] Recently, the concepts and techniques of osseointegration, periodontal plastic surgery, tissue regeneration, and esthetic restoration advanced our field.[9]

The following factors for the outcome of RST are size of occlusal table, amount of cortical plate covering submerged root, and presence or absence of any undercuts. Smaller occlusal table has better prognosis as approximation of flap is easy and primary healing is easily achieved, retained roots should have adequate coverage of cortical plate, and teeth should not have undercuts as it will compromise retention of the denture.[9,10]

Other studies have reported several complications such as periapical lesions, external root resorption, ankylosis, and root caries if a root is not completely covered, or if soft-tissue perforation occurs under functional removable prostheses. Such complications could result in extraction of the submerged roots and require multiple procedures to salvage the area. Therefore, precise clinical and radiographic examinations before and after the root submergence procedure are critical to prevent such complications.[11-13]

With caution, the RST could serve as a promising method of maintaining the dimensions of the alveolar ridge at the pontic site of a fixed dental prosthesis. More longitudinal follow-up studies are needed to evaluate the long-term outcomes of this technique.[14,15]

Conclusion

RST is a more conservative bone preservation technique for the teeth slated for extraction. It prevents the ridge collapse for future fixed prosthesis and helps in growth of the jaw in growing pediatric patient.

References

1. Padmawar N, Mustilwar R, Mopagar VP. Non-vital root submergence for preservation of socket in an adolescent a rare case report. J Evolution Med Dent Sci 2021;10:1448-50.
2. Agrawal DR, Jaiswal P, Dhadse PV, Chandak A, Gogiya R. Root submergence: An insight for alveolar bone preservation. J Datta Meghe Inst Med Sci Univ 2020;15:127-31.
3. Choi S, Yeo IS, Kim SH, Lee JB, Cheong CW, Han JS: A root submergence technique for pontic site development in fixed dental prostheses in the maxillary anterior esthetic zone. J Periodontal Implant Sci 2015;45:152-5.
4. Diangelis AJ, Andresasen JO, Ebeleseder KA, Kenny DJ, Trope M, Sigurdsson A, *et al*. International association of dental traumatology guidelines for the management of traumatic dental injuries: 1. fractures and luxations of permanent teeth. Dent Traumatol 2012;28:2-12.
5. Harper KA. Submerging an endodontically treated root to preserve the alveolar ridge under a bridge-a case report. Dent Update 2002;29:200-3.
6. Robertson A. A retrospective evaluation of patients with uncomplicated crown fractures and luxation injuries. Endod Dent Traumatol 1998;14:245-56.
7. Howell F. Retention of Alveolar Bone by Endodontic Root Treatment. Seminario Anual de1 Grupo de Estudios Dentales USC de. Mexico Vol. 23 1970.
8. Nevins M, Camelo M, De Paoli S, Friedland B, Schenk RK,

ParmaBenfenati S, *et al.* A study of the fate of the buccal wall of extraction sockets of teeth with prominent roots. Int J Periodontics Restorative Dent 2006;26:19-29.
9. Howell F. Retention of Alveolar Bone by Endodontic Root Treatment. Seminario Anual de1 Grupo de Estudios Dentales USC de. Mexico Vol. 23; 1970.
10. Johnson D, Kelly J, Flinton R. Histologic evaluation of vital root retention. J Oral Surg 1974;32:829-33.
11. Casey DM, Lauciello FR. A review of the submerged-root concept. J Prosthet Dent 1980;43:128-32.
12. Comut A, Mehra M, Saito H. Pontic site development with a root submergence technique for a screw retained prosthesis in the anterior maxilla. J Prosthet Dent 2013;110:337-43.
13. Wong KM, Chneh CM, Ang CW. Modified root submergence technique for multiple implant-supported maxillary anterior restorations in a patient with thin gingival biotype: A clinical report. J Prosthet Dent 2012;107:349-52.
14. Avila-Ortiz G, Elangovan S, Kramer KW, Blanchette D, Dawson DV. Effect of alveolar ridge preservation after tooth extraction: A systematic review and meta-analysis. J Dent Res 2014;93:950-8.
15. Gongloff RK. Vital root retention. A 5-year experience. Int J Oral Maxillofac Surg 1986;15:33-8.